

General Information about the Medicinal Plants in the Aravalli Ranges, its Conservation in the Form of Aravalli Biodiversity Park, India

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ABSTRACT

The Aravalli Range (also spelled Aravali) is a mountain range in Northwestern India, running approximately 670 km (430 mi) in a south-west direction, starting near Delhi, passing through southern Haryana and Rajasthan, and ending in Gujarat. The highest peak is Guru Shikhar at 1,722 metres (5,650 ft). In Rajasthan, the range runs from Khetri in the northeast to Khed Brahma in the southwest. Within Rajasthan for a length of about 550 kilometers. Aravalli's is the oldest range of fold mountains in India. Geologically, Aravalli range can be traced back probably close of the dharwar times and is composed of rocks belonging originally to the Delhi system, folded in a synclinorium occupying the site of the geosynclines which have been deeply eroded. The Aravalli range and Hilly Region has been further sub- divided into two smaller physiographic units:

1. North-Eastern Aravalli Range
2. Central Aravalli Range
3. The Mewar Rocky region and Bhorat Plateau
4. Abu Block Region

The standard ethnobotanical methods were followed. The plants were identified by available literature and flora. The data was collected through a series of field investigations. The systematic and random sampling methods were employed to study different locations. Ethnobotanical information was gathered using semi-structured interviews. The paper records (count) 53 important plant species of medicinal value from different families. Most of the plant species belonged to family Fabaceae followed by Moraceae and Asteraceae. The study revealed that Aravalli hills Gurgaon has much useful medicinal floras, that local people can use the parts of the plant in disease treatment and can modify, the ways of formulation application/administration and ingredients used in preparation.

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INTRODUCTION

Aravalli hills are hot spot of subtropical plant biodiversity. The tribal people of the region partially or fully depend upon herbal drugs for primary healthcare. Overexploitation of these plants has made several of them as endangered species. There are 16 protected areas, 6 are rich in medicinal plants. Phulwari, Sitamata, Kumbhalgarh, Mt. Abu, Balaram Ambaji and Jassore sanctuaries having 22, 18, 14, 12, 11 and 10 species respectively. Most of these sanctuaries are connected with corridors also. Jaisamand Sanctuary possess 12 species which is also situated in southern Aravallis. Sariska sanctuary (also a Tiger Reserve) possess 12 species of medicinal plants which is situated in northern Aravallis. Todgarh- Raoli supports 8 species of medicinal plants, which is a part of central Aravallis. Table S1 indicates that southern part of Aravallis is more rich than northern and central Aravallis. Protected areas of southern Aravallis and many territorial forest blocks like Kamalnath, Keora-ki-Nal, Samali, Ladan, Tinsara, Ramkunda, Har, Madri, Nal Sandol, Kirat, Raydari, Khokhariya-ki-Nal, etc. are rich in medicinal plants. Some worth recording species are *Milusa tomentosa*, *Cissampelos pariera*, *Cocculus hirsutus*, *C. pendulus*, *Tinospora*

cordifolia, *Caesaria elliptica*, *Sida acuta*, *S. cordata*, *Bombax ceiba*, *Helicteres isora*, *Corchorus depressus*, *Tribulus terrestris*, *Aegle marmelos*, *Balanites aegyptiaca*, *Azadirachta indica*, *Moringa oleifera*, *Abrus precatorius*, *Butea monosperma*, *Desmodium gangeticum*, *Mucuna pruriens*, *Pongamia pinnata*, *Cassia fistula*, *Tamarindus indica*, *Acacia catechu*, *Terminalia bellerica*, *Syzygium cumini*, *Diplocyclos palmatus*, *Centella asiatica*, *Gardenia turgida*, *Eclipta alba*, *Madhuca indica*, *Nyctanthes arbor-tristis*, *Carissa spinarum*, *Hemidesmus indicus*, *Enicostemma hyssopifolium*, *Ehretia laevis*, *Evovulus alsinoides*, *Solanum nigrum*, *Withania somnifera*, *Martynia annua*, *Adhatoda zeylanica*, *Barlaria cristata*, *Ocimum canum*, *Boerhavia diffusa*, *Achyranthes aspera*, *Aristolochia bracteolata*, *A. indica*, *Peperomia pellucida*, *Euphorbia fusiformis*, *Curcuma amada*, *C. angustifolia*, *C. aromatic*, *C. inodora*, *C. pseudomontana*, *Enset superbum*, *Curculigo orchoides*, *Dioscorea bulbifera*, *D. hispida*, *D. pentaphylla*, *Aloe vera*, *Asparagus asiaticus*, *A. royaleanus*, *A racemosus*, *Chlorophytum laxum*, *C. brevicaule*, *C. orchidastrum*, *C. tuberosum*, *Pandanus fascicularis*, etc. [1,2]

DISCUSSION

Table- showing uses of some medicinal plants found in the Aravalli ranges

S. No.	Name of Plants	Common name	Family	Part used	Medicinal uses
1	<i>Abutilon indicum</i> (L.) Sweet	Jhumka	Malvaceae	Seed and leaf extracts	Extract is given for urinary disorders
2	<i>Abutilon indicum</i> (Linn.)	Kanghi	Malvaceae	Leaves	Juice taken twice daily for two weeks
3	<i>Ageratum conyzoides</i> L.	Gana gaaju	Asteraceae	Leaves	Leaf extract given twice a day
4	<i>Amaranthus caudatus</i> L.	Love lies bleeding	Amaranthaceae	leaves	Extract is taken in kidney stone
5	<i>Aerva lanata</i> (L.) Juss.ex Schult	Pindikura	Amaranthaceae	leaves	Plant extract with <i>Cuminum cyminum</i> fruits and sugar is given for 10 – 15 days to cure kidney stone.
6	<i>Amaranthus spinosus</i> L.	Jangali chauli	Amaranthaceae	Root	Root paste use for reduces irritation in urinary duct
7	<i>Amaranthus viridis</i> L.	Mariro	Amaranthaceae	All parts	Given to cure kidney stone
8	<i>Asphodelus tenuifolius</i> Cav.	Piazi	Liliaceae	leaves	Decoction of leaves

Some worth recording species of this area are

Milusa tomentosa, *Cissampelos pariera*, *Cocculus hirsutus*, *C. pendulus*, *Tinospora cordifolia*, *Caesaria elliptica*, *Sida acuta*, *S. cordata*, *Bombax ceiba*, *Helicteres isora*, *Corchorus depressus*, *Tribulus terrestris*, *Aegle marmelos*, *Balanites aegyptiaca*, *Azadirachta indica*, *Moringa oleifera*, *Abrus precatorius*, *Butea monosperma*, *Desmodium gangeticum*, *Mucuna pruriens*, *Pongamia pinnata*, *Cassia fistula*, *Tamarindus indica*, *Acacia catechu*, *Terminalia*

bellerica, *Syzygium cumini*, *Diplocyclos palmatus*, *Centella asiatica*, *Gardenia turgida*, *Eclipta alba*, *Madhuca indica*, *Nyctanthes arbor-tristis*, *Carissa spinarum*, *Hemidesmus*

indicus, *Enicostemma hyssopifolium*, *Ehratia laevis*, *Evovulus alsinoides*, *Solanum nigrum*, *Withania somnifera*, *Martynia annua*, *Adhatoda zeylanica*, *Barlaria cristata*, *Ocimum canum*, *Boerhavia diffusa*, *Achyranthes aspera*, *Aristolochia bracteolata*, *A. indica*, *Peperomia pellucida*, *Euphorbia fusiformis*, *Curcuma amada*, *C. angustifolia*, *C. aromatic*, *C. inodora*, *C. pseudomontana*, *Enset supertubum*, *Curculigo orchoides*, *Dioscorea bulbifera*, *D. hispida*, *D. pentaphylla*, *Aloe vera*, *Asparagus asiaticus*, *A. royaleanus*, *A. racemosus*, *Chlorophytum laxum*, *C. breviscapum*, *C. orchidastrium*, *C. tuberosum*, *Pandanus fascicularis*, etc.

Tribals are using indigenous knowledge system to use different plants for various uses in their day-to day requirement. For different diseases, they use plant remedies through trial and error and process of experience over hundreds of years from generation to generation.[3]

The Aravalli Biodiversity Park (ABP) is being developed on 699 acres of land located at northwest of Vasant Vihar. The area is highly degraded due to past mining and infested with *Prosopis juliflora* (Vilayati kikar). The biodiversity of Delhi is nearly extinct. The prime objective of ABP is to bring back the lost biodiversity of Delhi Aravallis. The other objective of ABP is to promote of nature education among students and create environment awareness among the public. Overexploitation of medicinal plants from Aravallis has led to local extinction of many species having medicinal value. The ABP is not only preserving but also multiplying the threatened medicinal plants. The medicinal plant conservatory is also used to promote conservation, education and awareness on the importance of plants in health care system.[4]

Conservatory of Ferns Small mining pits have been developed into fernery on the similar pattern as that of Orchidarium, for the conservation of ferns such as *Pteris pellucida*, *Polystichum sp.*, *Actiniopteris radiata*, *Marsilea minuta*, *Pteridium esculentum* etc. Ferns are very ancient group of non flowering plants. Orchids and Ferns conservatories are unique and found only in ABP in Delhi.

Conservatory of Butterflies Butterflies and moths render pollination services that make orchards to produce fruits and seeds, crops to produce fruit, vegetables, seeds and grains, and forest plants to produce seeds. To bring back the winged beauties to Delhi, the conservatory of butterfly has been created by planting more than 100 species of host plants of butterflies.

The conservatory has more than 100 species of butterflies and moths. The notable species are Red pierrot, Pansies, Tigers, Grass jewel, Migrants, Common rose, Spot swordtail, Blues, Tiger moths, Skippers, Swifts, etc.

Showcase of Aravalli vegetation A showcase of Aravalli plant communities including Delhi forest, Rajasthan forest and Gujarat forest communities have been developed in visitors' zone. These communities are the miniature of forest communities which are expanded in vast areas of Aravalli Biodiversity Park.[5]

Sacred Grove The area around an old temple has been developed as a sacred grove. All plant species which have religious importance have been planted here such as *Ficus*, *Aegle*, *Nyctanthes arbor tristis*, *Sapindus*, *Madhuca* etc.

Tree conservatory A tree conservatory of 10 different native trees of Aravalli ranges has been developed in the visitor's zone. The tree species are *Boswellia serrata*, *Sterculia uresns*, *Lannea coromadelica*, *Prosopis cineraria*, *Anogeissus serecea*, *Pterocarpus*, *Butea monosperma* etc.

Nature Reserve zone ABP has a wide range of plant communities ranging from grasslands, shrubland, tropical thorn forest to broad-leaved deciduous forests. About 1000 species native to Aravallis have been ecologically assembled into 35 communities which have become home for many insects, amphibians, birds, reptiles and mammals. Some of the communities are:
(i) *Adina* – *Mitragyna*, (ii) *Terminalia tomentosa* – *Holoptelea*, (iii) *Anogeissus* – *Butea*, (iv) *Acacia* – *Balanites*,

(v) *Wrightia* – *Holarrhena*, (vi) *Sterculia* – *Boswellia*, (vii) *Grewia* – *Carissa*, (viii) *Rhus* – *Lycium*, and (ix) *Cenchrus* – *Heteropogon* and others. Many wild fruit yielding shrubs such as *Carrissa carandens*, *Ehretia laevis*, *Cordia gharaf*, *Zizyphus* sp., *Ficus* sp. were also planted in association with different forest communities to provide foraging habitat for different animal species.[6,7]

Rangeland ecosystem The rangeland spreads over an area of 150 acres. The grasslands are interspersed with patches of native bushes bearing edible fruits such as *Capparis*, *Carissa*, *Zizyphus* and *Acacia* woodland and *Butea monosperma* – *Prosopis cineraria* dominant communities. Groups of grey partridges, Indian hares, dancing peacocks, Black-breasted weavers, Indian silver-bills and occasionally thirsty jackals and blue bull are common inside the rangelands.

RESULTS

Nature Education Aravalli Biodiversity Park with its unique and beautiful undulating landscape harbouring Aravalli's natural heritage, is a paradise for nature lovers. The Park has network of nature trails passing through the dense recreated forest communities, grasslands and seasonal water bodies. Nature Education at Aravalli Biodiversity Park involves activities to inculcate love for **Nature and its Conservation** among people, especially the younger generation. Many programmes are conducted to spread the message of nature conservation focusing biodiversity and its benefits if you have around. The primary thrust of all the activities are learning by doing. Park encourages all nature lovers and all those who are interested in observing and learning from nature. This effort is an attempt “**How to learn from Nature**”. The Aravalli Biodiversity Park is the only place in Delhi which provides unique camping facilities to school children for imparting environmental education in natural ambience. A number of schools and colleges of NCT of Delhi have been availing this facility since the inception of this park. Scientists and nature education staff of the park interact with students and expose their first contact with nature, which can start a lifelong interest. It is a hub for conservation education.[8]

Aravalli Biodiversity Park Biodiversity profile

1.



Mammals

The ecologically diverse niches found within different plant communities enriched animal communities. The most common mammalian species found in the biotic communities are Jackal, blue bull, mongoose, porcupine, Indian hare, palm civet and bats. These mammals are presented by large populations.

Avifauna

The Aravalli Biodiversity Park is home to variety of birds because the habitat of ABP has diverse microclimatic conditions coupled with rich food base. More than 190 species have been sighted in ABP. The most prominent ones

are: Babblers, Barbets, Bee-eaters, Cuckoos, Bulbuls, Peafowl, Drongos, Flycatchers, Warblers, Parakeets, Munias, Partridges, Woodpeckers etc. In winter many migratory species such as Verditer flycatcher, Red throated flycatcher, Himalayan warblers, Peregrine falcon can be spotted here. Indian pitta (rare for Delhi) can also be seen here.

Amphibians and Reptiles The enhanced moisture levels coupled with thick leaf litter on the forest floor and availability of water in mining pits greatly contributed in the enrichment of amphibians and reptiles. A total of 29 species are encountered in ABP. The most common ones are: Common Indian toad, Skittering frog, Indian flap shelled turtle, Indian cobra, Common Indian krait, Saw scaled viper, Royal rat snake, Shaw's wolf snake, Red sand boa, Common sand boa etc.[9]

Among lizards, Indian monitor lizard, Fan throated lizard and Striped grass skink are common. Leopard gecko is found only in ABP and it is reported for the first time from Delhi.

Insects' diversity Insects are by far the most common type and most populous animal on the planet. Insects play a major role in the pollination of flowers, and also food base for many animals at some stage of their life. In fact, there are many plants that depend entirely on insects for pollination. Park includes a wide variety of insects which vary seasonally. There are more than 20 insects orders found in ABP, some them are mentioned below:

Hemiptera: bugs, water striders
Homoptera: cicadas
Hymenoptera: ants, bees, wasps
Lepidoptera: butterflies, moths
Orthoptera: crickets, grasshoppers
Araneae: spiders
Isoptera: termites
Coleoptera: fireflies. Beetles
Odonata: dragonflies, damselflies

Flowering plants



Aravalli Biodiversity Park has diverse landscape such as deep pits of varying depth and length, central flat land with small and shallow depressions, ridge type land with broad undulations with gentle to steep slope. This variation in landscape support wide range of plant communities ranging from grasslands, shrub land, and tropical thorn forest to broad-leaved deciduous forests. Wild native flowers yield a kaleidoscope of colours and forms as they bloom and fruits in different forest communities of the park.

CONCLUSION

We are a volunteer's group working for the betterment of Aravali – the oldest mountain range of India. The motive is to make it green, home to wildlife and entity of prosperity for the humans. The issue of legal protection, or a lack thereof, for the Aravalli hills of south Haryana, came to the fore in 2019, spurred by legislative amendments to the colonial-era Punjab Land Preservation Act (1900). Approved by the Haryana cabinet in February, the amendments would

have removed 60,000 acres of Aravalli land in the National Capital Region (NCR) from the legal definition of 'forest', opening them up to real estate and commercial interests.[10]

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